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THE PORCUPINE
ITS ECONOMIC STATUS AND CONTROL

D. A. Spencer, Branch of Wildlife Research

Life History

Description

The porcupine is one of the most interesting of our wildlife fauna, and as such deserves to be perpetuated. Mountains and extensive forested areas will always afford adequate habitat.

The porcupine is a chunky, heavy-bodied rodent that ranges the forested areas all along our northern border. There are two species in the area discussed, the Canadian porcupine (Erithezon dorsatum) that is found in the Northeastern States as far south as Pennsylvania, in the Lake States and thence northward to Alaska; and the yellow-haired porcupine (Erithezon epixanthum) that occurs from the Great Plains westward to the Pacific and from Alaska southward in the Rocky Mountains to southern Arizona. The western species is distinguished by having the outer portions of the guard hairs colored an olive yellow. However, brown and black phases occur in both species. The four inch deep ruff of quills and hair makes the animal appear as large as a bear cub while actually the top weight is in the neighborhood of 25 pounds. The tail is short, club-like, and a principal weapon in defense, but it also serves as a "fifth leg" in climbing trees. The eyes are bead-like and black, giving no light reflection at night; the ears are small and almost hidden in the fur; and the legs are short. The elongated track made by walking on the entire sole of the feet is decidedly "pigeon-toed." The heavy, wide incisor teeth, that serve as excellent wood chisels, have an outer enamel colored a distinct yellow.

The outstanding characteristic of a porcupine is, of course, its quills. They cover the rodent from above the eyes nearly to the tip of the tail (some 30,000 on an adult). Only the face, the underparts of the body, and the underpart of the tail are free of them. These quills vary in size, being stout and heavy on the tail and rump, and long and slender across the shoulders. The body of the quill is white, while the outer tip is black or brown and sharply pointed. This dark colored tip bears hundreds of microscopic, diamond shaped, scales that serve much the same purpose as barbs on a fish hook. The quills can be raised

and lowered but cannot be thrown. When attacked, the porcupine slaps its adversary with the quill-studded tail or makes a rolling lunge of the body, whereupon the barbed points are driven into the flesh and the quill is pulled from its base.

Habits

The rolling walk of a porcupine ordinarily is deliberate and unhurried as though the owner had complete confidence in the impregnability of its quill defense. When necessary the porcupine can run with considerable speed for short distances. However, when thoroughly alarmed it takes a defensive stand, and whirls about to bring the tail and raised quills along the rump toward the source of danger. If the attack is not pressed then the porcupine makes for the nearest tree or rock crevice for additional protection. It never attacks.

An expert climber, it spends much of its time in trees, sometimes feeding, but more often sleeping or sunning on a horizontal limb. The mountain lion, the bobcat, and the fisher successfully prey on the porcupine, for they too climb trees and have learned to avoid the quills by striking with clawed forepaw at the unprotected belly. While the wolf, coyote, and domestic dog corner and kill numerous porcupines, they often sustain serious quill injury in return.

The porcupine is most active at night, ordinarily spending the day asleep in some cave or perched high in some rest tree. It does not hibernate and is active throughout the year despite sub-zero temperatures and deep winter snows, and during those periods it fares much better than most wild animals. Porcupines are solitary in habit and over most of their range do not occur in any great numbers. Under forest conditions they occasionally reach a density of one animal to five acres. Seasonal concentrations also may occur, around ledges that provide winter denning sites, or concentrations may result from the attraction of ripening crops as sweet corn or apples.

Breeding

There is considerable movement in the fall of each year in the search of mates. Breeding takes place sometime between September and December, followed by an unusually long gestation period of seven months. 1/ In April, May, or June a single young is born. At birth it weighs about one pound, is densely black, and has fully formed quills commensurate with the size of the animal. The quills are soft at first but dry and stiffen into a useful defense armor within a half hour. The young are dependent on the mother for a very brief period, soon learning to feed on vegetation and otherwise fend for themselves.

1/ Shadle, Albert R. Gestation Period of the Porcupine, Jour. of Mammalogy 29: 162-164, 1948.

Food Habits

During the summer months the porcupine feeds on herbaceous plants and may be found in open meadows and fields and along the banks of streams and lakes. It finds garden and truck crops very acceptable, and early in the fall turns its attention to orchards where it feeds readily on the fruit. With the coming of frosts and snow that kill and bury the ground vegetation, the porcupine retreats to forested areas. Foliage of certain evergreens, such as hemlock and white, ponderosa, and pinon pine furnish substantial quantities in the diet, but the principal food is the inner bark (cambium and phloem layers) of a wide variety of forest trees. The outer corky layers of bark are chipped off and discarded while the succulent layers just beneath, that contain stored quantities of sugar and starch, are eaten.

Spring brings still another distinct change in feeding behavior. As soon as the flowers and catkins appear on the maple, willow, and poplar, the porcupine ceases to feed on "bark" and turns his attention to these food items. From the flowers he shifts to the new and tender leaves of such trees as aspen and larch. Shortly thereafter the succulent ground vegetation begins to grow, so the porcupine leaves the tree and the yearly food cycle begins to repeat itself.

Economic Status

Sparse populations of porcupines are the rule and only locally do they become over-abundant, to the detriment of the habitat. Nevertheless, the porcupine does little to merit his presence in a settled community. They may be attracted for miles to gardens, truck crops, and orchards. In Maine, where sweet corn is grown for commercial canning, porcupine raids, at the time the ear is in the milk stage, have drawn as many as thirty of these rodents to a one-acre field, leaving it as though cattle had broken in to feed. In the cultivated mountain valleys of Colorado they frequent alfalfa and grain fields and trample down more than they actually consume. Their presence about the farm and farm buildings raises still another problem. Domestic livestock have a fundamental curiosity about that slow-moving animal in the pasture with the result that a slap of the porcupine's tail drives scores of quills deep into tongue and muzzle. Some range cattle actually die from starvation following such a porcupine encounter. As for dogs, one veterinarian in Vermont reported that a considerable proportion of his income was derived from treating dogs who simply would not learn to avoid porcupines.

The most serious loss from porcupines is caused by their winter "bark" feeding on trees. Complete girdling results in the death of the tree, but even spot damage may seriously affect growth and timber value. Porcupine feeding on a pole-size tree most often occurs in the upper fourth of the main stem. The tree may not die but becomes spike-topped, quite useless for lumber, or as an ornamental shade tree. Furthermore, the porcupine exhibits a decided preference for certain tree species. In a northeastern mixed hardwood - conifer stand, the porcupine prefers sugar maple, beech, yellow and white birch, white pine, and white spruce,

all valuable timber trees. Most of the "weed trees" of the forest occur near the bottom of the food preference list. To aggravate matters, the porcupine often chooses the dominant and thriftiest trees on which to feed, leaving the suppressed and poorer ones to perpetuate the stand.

Losses in trees pose a variety of problems. They may involve the year by year protection of a 150-year-old maple sugar bush in Vermont, where the loss of even a few trees must be prevented; the protection of a managed "farm forest" like the five acre demonstration planting near Cabot, Vermont that was almost totally destroyed by porcupines from an adjoining rock quarry; checking the loss of 20 percent or better (with damage continuing) of ponderosa pine reproduction on extensive burns of the Black Hills National Forest; solving the problems on Mesa Verde National Park, where 85 percent of pinon pine over four inches in diameter bears porcupine feeding scars; and even the protection of one or a few trees essential to a public recreational area, or to a summer home in the mountains.

There are a number of minor, but nonetheless annoying problems of protecting structures and equipment from porcupine gnawing. Anything touched by human hands leaves a trace of salt from perspiration. The seasonal desire for salt causes the porcupine to do considerable damage to camps and summer homes that are unoccupied during the winter. Farm tool handles and the accoutrements of the camper, canoe and saddles may be damaged overnight. An example of the odd turn that porcupine damage may take is told by a Forest Service employee who left his car for a week at a time at the foot of the trail leading to his fire lookout station. On one occasion he carelessly left a window down with the result that a wandering porcupine stopped and worked on the steering wheel of the car until little more than the spokes remained.

Control

By Hunting

Time-consuming, but still one of the most effective means of porcupine control is by hunting with a .22 caliber rifle or club, as the occasion may prescribe. If a hunting program is to be both economical and effective in removing a high percent of the resident porcupines, then advantage must be taken of certain seasonal behaviorisms of the rodent. With the exception of defensive moves against porcupines feeding on crops, hunting in the summer is not effective. Within the first four hours after sunset, porcupines in a cornfield or orchard can easily be brought to bay by the use of a strong light. Since many States bar night hunting with lights and gun, a club is a good substitute. A little later in the fall, September 15-October 15, porcupines concentrate in open meadows, fields, and along road embankments. From a slowly cruising car equipped with a strong spotlight, and again by using a club (and a little leg work), good returns for man hours invested may be obtained. In the fall of 1949, Ralph Hill, Regional Biologist for the U.S. Forest Service and an associate, averaged some forty porcupines a night (to midnight only) along roads on the Harney National Forest. A daytime variation of this method was employed by the author on the Nicolet National Forest during that brief interval in Spring when porcupines

were feeding almost exclusively on flowers and catkins in otherwise leafless hardwoods. The porcupines were easily spotted from a slowly cruising car in late afternoon. By stepping off the road in each case 55 porcupines were collected with a .22 caliber rifle in little more than three hours.

The above are specialized and short-period conditions for hunting. The winter with its unbroken snow cover affords opportunity for mass or crew hunting on forested land. The spacing of the hunters that cover the area like skirmishers will depend on the density of the forest cover, but should be such that every tree and the snow beneath it comes under the scrutiny of one of the crew. More porcupines will be located by observing tracks or feeding debris fallen to the snow beneath a tree than by spotting the porcupine itself. By replacing the rifle with a .22 caliber pistol and with the aid of field binoculars effective work can be done. Snowshoes are, of course, a necessity . This method is particularly adapted to the Lake States and many western forests where porcupines use rest trees during the daytime, or where their dens are the simple ones like a hollow log, road culvert, or by the spreading roots of a wind-thrown tree. In the presence of rocky ledges, lava flows or talus slopes that the porcupines use for daylight retreats, winter hunting rarely succeeds in removing 50 percent of the population, in a one crew sweep. When snow trails and the pigeon-toed tracks indicate that the porcupine has retired to a den, one can still dispatch it by worming back into the cave or rock crevice and with the aid of a pocket flashlight bring the quarry into gun range. Porcupines denning in talus slopes, rock quarries or road fills and other deep and twisting crevices, are largely immune from hunting. In such situations traps or poison must take over.

There are a few other helpful suggestions in hunting. One should choose sunny and seasonably warm days whenever possible. If this follows immediately behind stormy weather, so much the better, for then porcupines may be busy feeding during daylight hours or sunning on some high leafless limb where they are easily seen. Avoid hunting on windy days, for porcupines like most wild animals, hold close to cover under such conditions and are difficult to locate. Porcupines tend to range less widely in winter than any other season. In barking trees for food they hold to a small radius and thus timber damage pockets are formed, the gleaming scars of which can be spotted from a distance. An experienced hunter can identify from a distance a freshly barked from one that was barked a month or so earlier by the color of the scar, and thus save many a weary step. New feeding is white and it changes to yellow with age. Consequently, the first step in such hunting of porcupines is to locate evidence of fresh feeding.

By Traps

The porcupine is rather indifferent to steel traps, so were it not for his low-slung "chassis," he could be easily taken by this method. As it is, there is many a repeat visit and not a few snapped traps before all the occupants of a multiple den are taken. A number 1½ single spring steel trap is recommended. It should be countersunk to general

surface level in the droppings at the den mouth, or in packed snow of the trail, with the trigger pan a little to one side of trail center. Such sets are not necessarily selective and thus should be visited each morning of the trapping period.

Trapping is also effective about the garden and orchard. Sets should be made in natural breaks in a fence, in runways, or in furrows. Set without countersinking about the base of an apple tree, traps will take a marauding porcupine very quickly, but the trap must be visited regularly or the porcupine will bark the tree near which it is imprisoned.

By Fencing

There are situations where the forest habitat adjoins a commercial agricultural development, leading to persistent difficulties with porcupines. A wire-mesh drift fence separating the two areas, with trap sets at each wire and mesh fence will not long bar the entrance by a rodent that climbs as well as the porcupine. This can be remedied by use of electric fence equipment such as is commonly employed to manage domestic livestock. Mount the "hot" wire on porcelain insulators some 18 inches (or more) above the ground on the outer side of the mesh fence so that it is two inches out from the fence proper. Maintain this two inch distance by frequent use of plastic spacing links between the "hot" wire and the fence netting. The negative pole of the electric controller unit is connected with both the fence netting and with a steel stake driven into the soil. The top of the fence proper must extend at least six inches above the level of the "hot" wire. Thus, the total height of the fence can be as low as 24 inches, but the height of vegetative growth that would touch and "short-out" the "hot" wire will govern the fence construction. 2/

Poison Baits

Because of the potential hazard to beneficial wildlife, control by poison baits is justified only where other means fail, or where costs of other procedures is prohibitive by comparison. Furthermore, current information on baits and bait formulations does not disclose any preparation of outstanding effectiveness. The strychnine-salt formula currently used against the western yellow-haired porcupine, has little value against the Canadian porcupine, due probably to the tanin content of its winter food. In other words, poison bait is not the panacea in porcupine control that it is for some other rodents.

2/ Spencer, Donald A. An Electric Fence for Use in Checking Porcupine and Other Mammalian Crop Depredations. Jour. Wildlife Management 12:110-111, 1948.

A formula prepared by thoroughly mixing one ounce of powdered alkaloid strychnine with one pound of finely crystallized table salt, which may be pressed into solid cakes by the addition of powdered yellow dextrin and a little moisture, or pasted by the addition of a few ounces of soft cooking fat, has been employed successfully under certain Western conditions. The porcupine's fondness for salt is duplicated by livestock and many game and beneficial animals, so considerable care must be exercised in its placement. It is best employed in baiting dens in ledges, lava flows, and rock slides. It should be placed well back from the opening of the den, on a side ledge if possible. If a wooden block or other movable container is used to hold the salt, then it should be fastened securely in place. Only those dens where the accumulation of droppings over the years show it is being used by winter concentrations of porcupines should be so baited. Hollow logs and other small and temporary den sites should not be treated with this strychnine-salt.

The porcupine in Arizona uses what is known as a "rest tree," which is usually characterized by a high, broad, and exposed lateral limb. Individual porcupines, drifting around or through the timbered area tend to use the same rest trees. Thus the rest tree serves as a drawing point for a bait placement. A block of wood made from a 2 x 4 timber is drilled out to form a hollow cup. This is nailed to the main trunk about 8 inches above the lateral limb, thus placing it high above the reach of livestock and game animals. The cup is then filled with fat-pasted, strychnine-salt. It should be stressed that the tree station control method is no better than the drawing power of the rest tree for a number of porcupines. While lines of movement and migration of porcupines have been recorded, across which poison stations could be thrown, this behaviorism appears to be local in scope and not applicable to many areas. In practice, the "tree station" has failed to control porcupines more often than it has succeeded.

It is the recommendation of the Fish and Wildlife Service that no program for the poison control of porcupines be undertaken, except with the advice and guidance of personnel thoroughly familiar with the habits of this rodent and the multiple hazards associated with poison handling.